Serial No.: 10/777,437

Filed: February 12, 2004

Page : 2 of 12

## Amendments to the Claims

This listing of claims replaces all prior versions and listings of claims in the application. Please amend the claims as follows:

1. (Amended) A method of performing online valve diagnostics for a valve operating in a process, the method comprising:

obtaining valve information while said valve operates in response to a eontrol signal a plurality of setpoints determined for controlling said process, said valve operating through a series of gradual movements;

said valve information including at least two of setpoint data, position data and pressure data;

deriving at least one of step response, friction and spring range for said valve based on said valve information.

2. (Amended) The method of claim 1 further comprising:

deriving a model of valve response to setpoint changes in response to said valve information;

adjusting said model in response to error between predictions generated by said model and actual position information; and

applying a step input to said model to generate a step response.

3. (Original) The method of claim 2 wherein:

adjusting said model includes adjusting a first parameter affecting response time.

Serial No.: 10/777,437

Filed: February 12, 2004

Page : 3 of 12

4. (Original) The method of claim 3 wherein:

adjusting said model includes adjusting a second parameter affecting overshoot.

5. (Original) The method of claim 2 wherein:

said deriving said model includes taking a derivative of a setpoint data and taking a derivative of position data;

solving for a set of coefficients that minimizes the error estimating said derivative of position data from said derivative of input data to define a wavelet; said applying said step input to said model includes integrating said

wavelet; and

deriving response time and overshoot from said step response.

6. (Original) The method of claim 2 wherein:

said deriving said model includes obtaining plurality of wavelets in response to setpoint changes;

said adjusting includes selecting one of said wavelets with minimal error; deriving a step response by applying said wavelet to an impulse; and deriving response time and overshoot from said step response.

7. (Original) The method of claim 1 further comprising:

deriving a distribution of said position data by transforming said pressure data and said position data in response to a spring range of said valve;

determining friction of said valve in response to said distribution.

8. (Original) The method of claim 7 wherein:

said determining friction includes determining a difference between an upper percentile and a lower percentile of said distribution.

Serial No.: 10/777,437

Filed: February 12, 2004

Page : 4 of 12

9. (Original) The method of claim 8 wherein:
said upper percentile is 90 percent and said lower percentile is 10 percent.

10. (Original) The method of claim 7 wherein:

said deriving said distribution includes projecting position data to a pressure axis along a slope corresponding to said spring range.

11. (Amended) The method of claim 1 further comprising:

deriving a plurality of distributions of said position data in response to a plurality of spring ranges of said valve;

selecting one of said spring ranges in response to variance of said plurality of distributions.

12. (Amended) A system for deriving valve characteristics of a valve operating in a process, the system comprising:

a process controller generating control signals to operate a plurality of setpoints determined for controlling said process, said plurality of setpoints operating said valve through a series of gradual movements;

a positioner receiving said control signal plurality of setpoints and generating a signal for positioning said valve;

a controller receiving valve information from said positioner while it is operating based on the setpoints, said valve information including at least two of setpoint data, position data and pressure data;

said controller deriving at least one of step response, friction and spring range for said valve based on said valve information.

Serial No.: 10/777,437

Filed: February 12, 2004

Page : 5 of 12

13. (Amended) A storage medium encoded with machine-readable computer program code for deriving valve characteristics of a valve operating in a process, the storage medium including instructions for causing a controller to implement a method comprising:

obtaining valve information while said valve operates in response to a control signal a plurality of setpoints determined for controlling said process, said valve operating through a series of gradual movements;

said valve information including at least two of setpoint data, position data and pressure data;

deriving at least one of step response, friction and spring range for said valve based on said valve information.